PERRY JOHNSON LABORATORY ACCREDITATION, INC.

Certificate of Accreditation

Perry Johnson Laboratory Accreditation, Inc. has assessed the Laboratory of:

International Light Technologies, Inc.

10 Technology Drive, Peabody, MA 01960

(Hereinafter called the Organization) and hereby declares that Organization is accredited in accordance with the recognized International Standard:

ISO/IEC 17025:2005
& Meets the Requirements of ANSI/NCSI Z540.1-1994
& ANSI/NCSI Z540.3-2006 subclause 5.3

This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system
(as outlined by the joint ISO-ILAC-IAF Communiqué dated January 2009):

Calibration of Electrical and Optical Devices
(As detailed in the supplement)

Accreditation claims for such testing and/or calibration services shall only be made from addresses referenced within this certificate. This Accreditation is granted subject to the system rules governing the Accreditation referred to above, and the Organization hereby covenants with the Accreditation body's duty to observe and comply with the said rules.

For PJLA:

Tracy Szerszen
President/Operations Manager

Perry Johnson Laboratory Accreditation, Inc. (PJLA)
755 W. Big Beaver, Suite 1325
Troy, Michigan 48084

Initial Accreditation Date:	*Issue Date:*	*Expiration Date:*
January 2, 2012	November 29, 2017	March 31, 2020

Accreditation No.:	*Certificate No.:*
66765	L17-501

The validity of this certificate is maintained through ongoing assessments based on a continuous accreditation cycle. The validity of this certificate should be confirmed through the PJLA website: www.pjlabs.com

Certificate of Accreditation: Supplement

International Light Technologies
10 Technology Drive, Peabody, MA 01960
Contact Name: John Ellis Phone: 978-818-6180

Accreditation is granted to the facility to perform the following calibrations:

Electrical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Research Radiometers & Photometers Fixed points [F]	1 mA	3.6×10^{-7} A	Keithley Current Calibrator
	100 uA	3.4×10^{-8} A	
	10 uA	6.2×10^{-9} A	
	1 uA	6.5×10^{-10} A	
	100 nA	7.3×10^{-11} A	
	10 nA	7.9×10^{-12} A	
	1 nA	8.4×10^{-13} A	
	100 pA	2.6×10^{-13} A	
	10 pA	1.3×10^{-13} A	
	1 pA	4.2×10^{-14} A	
Portable Radiometers & Photometers Fixed points [F]	300 µA	6×10^{-7} A	
	100 µA	6.8×10^{-8} A	
	10 µA	6.2×10^{-9} A	
	1 µA	6.4×10^{-10} A	
	100 nA	6.5×10^{-11} A	
	10 nA	1.2×10^{-11} A	
	1 nA	2.2×10^{-12} A	

Optical

MEASURED INSTRUMENT, QUANTITY OR GAUGE	RANGE (AND SPECIFICATION WHERE APPROPRIATE)	CALIBRATION AND MEASUREMENT CAPABILITY EXPRESSED AS AN UNCERTAINTY (±)	CALIBRATION EQUIPMENT AND REFERENCE STANDARDS USED
Spectroradiometers Spectral Irradiance At the listed Wavelengths [F]			Calibrated Standard Lamp
200 nm to 350 nm	1×10^{-9} W/cm^{2}nm to 1×10^{-2} W/cm^{2}nm	11 % of Reading	
350 nm to 400 nm	3×10^{-8} W/cm^{2}nm to 1×10^{-2} W/cm^{2}nm	5 % of Reading	
400 nm to 900 nm	1×10^{-7} W/cm^{2}nm to 7×10^{-3} W/cm^{2}nm	3.3 % of Reading	
900 nm to 1 050 nm	1×10^{-6} W/cm^{2}nm to 4×10^{-2} W/cm^{2}nm	5 % of Reading	
Spectroradiometers Spectral Radiance At the listed Wavelengths [F]			
200 nm to 350 nm	5×10^{-8} W/sr cm^{2}nm to 3×10^{-2} W/sr cm^{2}nm	11 % of Reading	
350 nm to 400 nm	5×10^{-8} W/sr cm^{2}nm to 2×10^{-3} W/sr cm^{2}nm	5 % of Reading	
400 nm to 900 nm	2×10^{-7} W/sr cm^{2}nm to 2×10^{-3} W/sr cm^{2}nm	3.3 % of Reading	
900 nm to 1 050 nm	2×10^{-6} W/sr cm^2 nm to 2×10^{-2} W/sr cm^{2}nm	5 % of Reading	

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Belt Radiometers 200 nm to 500 nm	10 mW/cm^2 to 200 mW/cm^2	6.2 % of Reading	Silicon Photodiodes Phototubes
Handheld Radiometers At the listed Wavelengths [F]			
200 nm to 250 nm	1 x 10^{-10} W/cm^2 to 8 x 10^{-6} W/cm^2	11 % of Reading	
250 nm to 400 nm	1 x 10^{-10} W/cm^2 to 7 x 10^{-3} W/cm^2	5 % of Reading	
400 nm to 960 nm	1 x 10^{-10} W/cm^2 to 2 x 10^{-2} W/cm^2	4 % of Reading	
Extended UV Scanned Irradiance At the listed Wavelengths [F]			Silicon Photodiodes
200 nm to 250 nm	1 x 10^{-10} W/cm^2 to 8 x 10^{-6} W/cm^2	7.1 % of Reading	
250 nm to 400 nm	1 x 10^{-10} W/cm^2 to 7 x 10^{-3} W/cm^2	4.1 % of Reading	
Irradiance Response At the listed Wavelengths [F]			
200 nm to 250 nm	1 x 10^{-10} W/cm^2 to 8 x 10^{-6} W/cm^2	11 % of Reading	
250 nm to 400 nm	1 x 10^{-10} W/cm^2 to 7 x 10^{-3} W/cm^2	4.5 % of Reading	
400 nm to 960 nm	1 x 10^{-10} W/cm^2 to 2 x 10^{-2}W/cm^2	3 % of Reading	
960 nm to 1 000 nm	1 x 10^{-10} W/cm^2 to 1 x 10^{-4} W/cm^2	4.5 % of Reading	
1 000 nm to 1 100 nm	1 x 10^{-10} W/cm^2 to 1 x 10^{-4} W/cm^2	5 % of Reading	
Radiance Response At the listed Wavelengths [F]			
200 nm to 250 nm	3 x 10^{-11} W/cm^2/sr to 3 x 10^{-6} W/cm^2/sr	11 % of Reading	
250 nm to 400 nm	3 x 10^{-11} W/cm^2/sr to 3 x 10^{-3} W/cm^2/sr	4.5 % of Reading	
400 nm to 960 nm	3 x 10^{-11} W/cm^2/sr to 7 x 10^{-3} W/cm^2/sr	3 % of Reading	
960 nm to 1 000 nm	3 x 10^{-11} W/cm^2/sr to 3 x 10^{-5} W/cm^2/sr	4.5 % of Reading	
1 000 nm to 1 100 nm	3 x 10^{-11} W/cm^2/sr to 3 x 10^{-5} W/cm^2/sr	5 % of Reading	
Radiant Intensity Response Based on 125 mm distance. Values vary per application distance. At the listed Wavelengths [F]			
200 nm to 250 nm	1 x 10^{-8} W/sr to 2 x 10^{-3} W/sr	11 % of Reading	
250 nm to 400 nm	1 x 10^{-8} W/sr to 1 W/sr	4.5 % of Reading	
400 nm to 960 nm	1 x 10^{-8} W/sr to 3 W/sr	3 % of Reading	
960 nm to 1 000 nm	1 x 10^{-8} W/sr to 2 x 10^{-2} W/sr	4.5 % of Reading	
1 000 nm to 1 100 nm	1 x 10^{-8} W/sr to 2 x 10^{-2} W/sr	5 % of Reading	

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Accreditation is granted to the facility to perform the following calibrations:

Optical

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Radiant Power Response At the listed Wavelengths [F]			Silicon Photodiodes
200 nm to 250 nm	4×10^{-12} W to 4×10^{-7} W	11 % of Reading	
250 nm to 400 nm	4×10^{-12} W to 3×10^{-4} W	4.5 % of Reading	
400 nm to 960 nm	4×10^{-12} W to 3×10^{-3} W	3 % of Reading	
960 nm to 1 000 nm	4×10^{-12} W to 4×10^{-6} W	4.5 % of Reading	
1 000 nm to 1 100 nm	4×10^{-12} W to 4×10^{-6} W	5 % of Reading	
Illuminance Sensitivity At the listed Wavelength [F]			
400 nm to 700 nm	9×10^{-4} lx to 20 klx	2.4 % of Reading	
Luminance Sensitivity At the listed Wavelengths [F]			
400 nm to 700 nm	2×10^{-4} cd/m^2 to 60 kcd/m^2	2.4 % of Reading	
Luminous Intensity of a Standard Lamp At the listed Wavelengths [F]			
400 nm to 700 nm	3×10^{-7} cd to $4 \times 10^{+2}$ cd	2.4 % of Reading	
Luminous Intensity Sensitivity *Based on 125 mm distance. Values vary per application distance.* At the listed Wavelengths [F]			
400 nm to 700 nm	1×10^{-7} cd to 30 cd	2.4 % of Reading	
Luminous Power Sensitivity At the listed Wavelengths [F]			
400 nm to 700 nm	3×10^{-8} lm to 8 lm	2.4 % of Reading	

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Accreditation is granted to the facility to perform the following calibrations:

1. The CMC (Calibration and Measurement Capability) stated for calibrations included on this scope of accreditation represents the smallest measurement uncertainty attainable by the laboratory when performing a more or less routine calibration of a nearly ideal device under nearly ideal conditions. It is typically expressed at a confidence level of 95 % using a coverage factor *k* (usually equal to 2). The actual measurement uncertainty associated with a specific calibration performed by the laboratory will typically be larger than the CMC for the same calibration since capability and performance of the device being calibrated and the conditions related to the calibration may reasonably be expected to deviate from ideal to some degree.

2. The laboratories range of calibration capability for all disciplines for which they are accredited is the interval from the smallest calibrated standard to the largest calibrated standard used in performing the calibration. The low end of this range must be an attainable value for which the laboratory has or has access to the standard referenced. Verification of an indicated value of zero in the absence of a standard is common practice in the procedure for many calibrations but by its definition it does not constitute calibration of zero capacity.

3. The presence of a superscript F means that the laboratory performs calibration of the indicated parameter at its fixed location. Example: Outside Micrometer ^{F} would mean that the laboratory performs this calibration at its fixed location.